

Heat Capacity Anomaly in Succinonitrile and Water

D.T. Jacobs, A. Nowicki, M. Ghosh, and S. McClellan

Physics Department

The College of Wooster

Wooster, OH 44691 U.S.A.

Succinonitrile is a plastic crystal at room temperature, but when mixed with water the system exhibits a critical point typical of liquid-liquid mixtures. The two-phases have very similar densities, which minimizes gravity effects. The heat capacity at constant pressure has been measured in the near-critical mixture using our own computer-based data acquisition and control, adiabatic calorimeter. A step process of adding heat and then waiting several minutes for a stable temperature assures equilibrium values for the heat capacity from the known heat added and the resulting change in temperature. By measuring the heat capacity in the one- and two-phase regions within ± 2 degrees of the critical temperature (329 K), we find the anomaly in the heat capacity to be characterized by a simple scaling relationship using the critical exponent α as 0.11. The resulting amplitudes allow universal relationships to be tested.

Acknowledgment is made to the donors of The Petroleum Research Fund, administered by the ACS, for support of this research and for funding from NASA grant NAG8-1433.